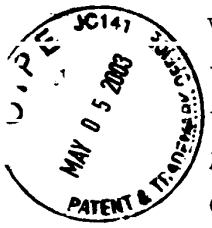
CERTIFICATE OF TRANSLATION

I, Björn Jonsson, an employee of ABB Group Services Center AB (Legal & Compliance/Intellectual Property), Västerås, Sweden, do hereby certify that the attached is a true and correct translation from Swedish into English of the Swedish priority document relating to Swedish Patent Application No. 9902480-4, filed in the Swedish Patent Office on the 30th day of June 1999.



Västerås, Sweden, this 4th day of April 2003.

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Björn Jonsson

METHOD OF THREADING

FIELD OF THE INVENTION

The present invention relates to a method for threading a web-shaped material through a processing plant.

The method is specifically adapted for threading a web-shaped material through a processing plant, in which the web-shaped material, in alternating directions, passes through two or more storeys, and in particular when the processing plant is adapted to tension the web-shaped material by regulating the speed of one or more conveying cylinders so that somehow established tractive force is absorbed by the web-shaped material.

BACKGROUND ART

Web-shaped materials are in technical contexts processed with widths of several meters and at considerable web speeds. Moreover, transfer often occurs between two or more processing steps, in which an accurate control is necessary to prevent operational disorder.

Especially when starting operation, the transfer between processing steps is a most critical point. When transferring a web-shaped material between two processing steps, one therefore usually begins with a narrow strip at one edge of the web-shaped material, a so-called leader. The leader is pulled through the processing step and then the width of the material to be processed is successively increased until finally the entire width is achieved. The part separated during the threading is rejected or recycled for reworking.

If the processing plant comprises more than two steps, the threading process must be repeated in each transition. This means that the reliability and speed of

a threading method is most important to efficiency and economic yield. Each failure costs a lot of money.

Originally the width of the leader is purposely very small relative to the full width of the web-shaped material. As the successive increase of the width proceeds, this results in the fact that it will be possible to have in the processing step a web of material with a width from e.g. 0.1 m to 6 m. This means that the force by which the web is pulled through the processing step must be controlled most accurately. The length of the material in a processing step can, like in paper and cellulose dryers, be several hundreds of meters. However, the critical point is where the web enters a dryer since the low dry solids content then gives the lowest strength.

One example of a close prior-art method is described in US-5,158,648. This publication describes in detail the established technique using an edge strip in connection with threading and the drawbacks involved therein. As an improvement it is suggested that the web be broadened symmetrically starting from a central point. To this end, use is made of two knives which are freely movable over the width of the web. This is said to prevent moving and flapping of the web.

An operator monitors the process and controls the retrieval of slack and regulates the tension of the web.

OBJECT OF THE INVENTION

An object of the invention is to provide a quick and reliable method for threading a web-shaped material.

In particular the invention aims at providing a quick and reliable method for threading in transferring a web of pulp from the wet end to a dryer when manufacturing papermaking pulp and in transferring a paper web from the wet end to a dryer when making paper.

SUMMARY OF THE INVENTION

The present invention relates to a method for threading a web-shaped material through a processing plant. The web-shaped material is divided, by a longitudinal cut, into a first narrow part and a second broad part, the first part being passed through the processing plant while the second part is separated. The width of the first part is successively increased so that a growing share of the web-shaped material is passed through the processing plant. Finally, the entire width of the web-shaped material is passed through the processing plant. The web-shaped material is pulled through the processing plant by a controllable force (tension).

In the method according to the invention, the magnitude of the controllable force is automatically adjusted to the width of the first part of the web-shaped material, preferably so that the magnitude of the force is selected proportional to the width of the first part.

GENERAL DESCRIPTION OF THE INVENTION

When threading a web-shaped material through a processing plant, the web-shaped material is divided, by a longitudinal cut, into a first narrow part and a second broad part, the first part being passed through the processing plant while the second part is separated. The width of the first part is successively increased so that a growing share of the web-shaped material is passed through the processing plant. This is a critical phase in the production of, for example, paper. The risk of repeated breaks of the web with the ensuing long down-times is obvious. The conventional method of controlling the force by which the leader is pulled through the dryer is that an operator first performs the retrieval of the slack forming on the occasion of starting and subsequently manually increases the tractive force in the web, the

so-called web tension, so that the web is kept sufficiently tensioned but is not subjected to such stress as results in web break.

According to the present invention it is suggested that the magnitude of the controllable force that pulls the web through the dryer be automatically adjusted to the width of the first part, the leader, of the web-shaped material. This should in the first place occur in such manner that the magnitude of the force is selected proportional to the width of the first part.

The preferred principle is that the magnitude of the force is adjusted proportional to the width of the web when entering the dryer. This can be carried out, for example, by synchronous control of the position of the knife dividing the web and the tractive force giving the tension to the web. A further possibility is that the width of the web is measured in the vicinity of the web entering the dryer and that this measured value is allowed to control the tractive force.

After an initial interval with an essentially constant width, the width of that part which is passed through the processing plant is successively increased. This may occur continuously, but occurs suitably through at least two monotonously growing phases with an intermediate interval with an essentially constant width, preferably through three or more monotonously growing phases with an intermediate interval with an essentially constant width.

If the web-shaped material, in alternating directions, passes through two or more storeys, the length of the intermediate interval or intervals should exceed the length of the web-shaped material located in an individual storey. Suitably the length of the intermediate interval or intervals is smaller than twice the length of the web-shaped material located in an individual storey.

The length of at least one monotonously growing phase should be smaller than the length of the web-shaped

material located in an individual storey. In a preferred embodiment, the length of each of two or more monotonously growing phases, preferably the first phases, is smaller than the length of the web-shaped material located in an individual storey.

The width of the first part during the initial interval should be 50-200 mm, preferably about 100 mm.

The width of the first part during one or more monotonously growing phases should be increased by a factor 2 to 5.

BRIEF DESCRIPTION OF THE FIGURES

The invention will now be described in more detail with reference to the accompanying drawing, in which

Fig. 1 is a schematic vertical view of a pulp dryer according to the invention;

Fig 2 is a schematic horizontal view of the same pulp dryer according to the invention.

DESCRIPTION OF A PREFERRED EMBODIMENT

Fig. 1 illustrates a simplified design of a pulp dryer 1 comprising four driven terminal rolls 2 over which a pulp web 3 is passed. At the inlet of the dryer 1, a movable knife 6 and a deflecting roll 7 are arranged, followed by a load sensing means 4 between two supporting rolls 5. The knife 6 can be moved transversely to an arbitrary position along a positioning means 8.

Fig. 2 is a horizontal view of the same pulp dryer 1. Where applicable, the reference numerals are the same. In addition, a control unit 10 is illustrated, which is connected to the positioning means 8, the load sensing means 4 and the driving devices for the terminal rolls 2.

The pulp web 3 is divided by means of the knife 6 into a leader 31 which is passed through the dryer 1, and a second part 32 which via the deflecting roll 7 is separated and recirculated to the forming station (not shown) of the pulp web. The control unit 10 controls the position of the knife 6 with the aid of the positioning means 8 so that the desired width of the leader 31 is obtained. The control unit 10 also controls the driving devices for the terminal rolls 2, so that the load sensing means 4 registers a predetermined force in the web 3 (web tension).

By means of a threading cord (not shown) a narrow leader 31 is first introduced into the dryer. Subsequently, the leader 31 is successively widened according to a predetermined programme so that finally the entire web 3 is passed through the dryer 1. The control unit 10 controls the driving of the terminal rolls 2 so that the force in the web (web tension) grows proportionally to the width of the leader 31 at the inlet of the dryer 1. Preferably, this takes place by synchronous control of the position of the knife 6 and the desired value of the load sensing means 4.

CLAIMS

1. A method for threading a web shaped material through a processing plant, in which

the web-shaped material is divided by a longitudinal cut into a first narrow part and a second broad part, the first part being passed through the processing plant while the second part is separated,

the width of the first part is increased successively so that a growing share of the web-shaped material is passed through the processing plant, so that

finally the entire width of the web-shaped material is passed through the processing plant, and

the web-shaped material is pulled through the processing plant by a controllable force (tension),

c h a r a c t e r i s e d in

that the magnitude of the controllable force is automatically adjusted to the width of the first part of the web-shaped material, preferably in such manner that the magnitude of the force is selected proportional to the width of the first part.

2. A method according to claim 1, c h a r a c t e r i s e d in that the magnitude of the controllable force is automatically adjusted to the width of the first part of the web-shaped material when entering the dryer, preferably so that the magnitude of the force is selected proportional to the width of the first part where the longitudinal cut is made.

3. A method according to the claim 1 or 2, c h a r a c t e r i s e d in

that the successive increase of the width of that part which is passed through the processing plant is preceded by an initial interval with an essentially constant width, and

that the successive increase of the width of that part which is passed through the processing plant occurs through at least two monotonously growing phases with an intermediate interval with an essentially constant width, preferably through three or more monotonously growing phases with an intermediate interval with an essentially constant width.

4. A method as claimed in claim 1, 2 or 3, for threading a web-shaped material through a processing plant, in which the web-shaped material, in alternating directions, passes through two or more storeys, c h a r a c t e r i s e d in

that the length of the intermediate interval or intervals exceeds the length of the web-shaped material located in an individual storey, but

that the length of the intermediate interval or intervals preferably is smaller than twice the length of the web-shaped material located in an individual storey.

5. A method according to any one of the preceding claims, c h a r a c t e r i s e d in
that the length of at least one monotonously growing phase is smaller than the length of the web-shaped material located in an individual storey.

6. A method according to any one of the preceding claims, c h a r a c t e r i s e d in
that the length of each of two or more monotonously growing phases, preferably the first phases, is smaller than the length of the web-shaped material located in an individual storey.

7. A method according to any one of the preceding claims, c h a r a c t e r i s e d in
that the width of the first part during the initial interval is 50-200 mm, preferably about 100 mm.

8. A method according to any one of the preceding claims, c h a r a c t e r i s e d in
that the width of the first part during one or more monotonously growing phases is increased by a factor 2 to 5.

ABSTRACT

A method for threading a web shaped material through a processing plant. The web-shaped material is divided, by a longitudinal cut, into a first narrow part and a second broad part, the first part being passed through the processing plant while the second part is separated. The width of the first part is increased successively so that a growing share of the web-shaped material is passed through the processing plant. Finally the entire width of the web-shaped material is passed through the processing plant. The web-shaped material is pulled through the processing plant by a controllable force (tension).

The magnitude of the controllable force is automatically adjusted to the width of the first part of the web-shaped material, preferably in such manner that the magnitude of the force is selected proportional to the width of the first part.

Publication figure: Fig. 2